Highlights

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Washington SCIENCE TRENDS

Ballistic Missile Early Warning

Air Force is running into difficulties with the Department of Defense on construction of a third surveillance radar installation for its Ballistic Missile Early Warning System (BMEWS). Air Force has also been blocked in its attempts to include tracking radar in the BMEWS installations.

BMEWS Objectives: Air Force plans call for construction of three installations in the Arctic regions to provide a 15 minute warning of mass attack by ICBM's. A central computer and display facility will be located in the combat operations center of the North American Air Defense Command at Colorado Springs, Colo. Authorized program is reported to be on schedule. Last summer alone, some 80,000 tons of material were shipped.

Spending Ceiling: Air Force reports to Congress that the Secretary of Defense has placed an $822 million ceiling on expenditures for the project. Funds are being requested up to that figure, but would only provide for a two-station complex. Some equipment now being procured could, however, be diverted to a third site. Air Force originally estimated that the three sites could be completed for $721 million; now admits that it was "vastly in error."

Tracking Radars: No tracking radars are being procured at this time, although the Defense Department was persuaded to authorize the construction of foundations for mounting the equipment if it is ordered at a later date. Air Force argued that construction of foundations was necessary to prevent possible shut-down of the surveillance system for addition of trackers.

Air Force believes that trackers are necessary to help determine speed, direction and impact area of ICBM's, to serve as a backup in case of failure of the basic surveillance radar and to discriminate between actual targets, space debris and decoys. A prototype tracker is being installed at Moorestown, N.J. and is expected to be in operation by October.

Transmitters: Air Force is hoping to choose shortly between a triode and klystron transmitter system. The triode system was "considered to be in trouble" until earlier this year but has now overcome its difficulties and both types appear "quite satisfactory." A single selection will be made. If possible, the "unsuccessful" transmitter will be used at one of the planned sites.

Contractors: RCA is prime contractor for the system and electronic equipment, Western Electric for the communications.

Minuteman Progress

Air Force is studying plans for deployment of its solid propellant Minuteman ICBM on railroad cars, highway trucks and river barges. Advantages are expected in mobility and concealment. However, cost analyses show that such deployment would be more expensive than "hardening" and building an underground silo launching site.

* Railroad Launchers: Special trains carrying support equipment would be required for the mobile rail launching plan. A concept displayed to Congress envisions a special launching car with a hinged cover. The missile would be raised and stand on a blast deflector. It is believed that such trains would stop along the track for a day and then move to another site. Launchings could only take place at definitely planned locations.

* Development Program: Air Force has already had a "subscale" testing of the missile out of silos at Edwards Air Force Base, Calif. The first full-scale test will also be at Edwards. First flight of Minuteman will be from Cape Canaveral, to be followed by a silo-launching test flight at the same location.

* Possible Acceleration: Air Force has looked into the possibility of speeding up the Minuteman Program. However, Congress was told this might involve some additional risk "and perhaps some degradation of the system." Budget program for the next Fiscal Year envisages weapon system development only and does not provide for operational deployment. An acceleration of approximately six months is forecast if an additional $87 million were to be authorized now for a full development-production program.

New Army Radar

New Army radar device developed by Hazeltine is said to provide a "vastly increased capability" for detecting enemy personnel and vehicle-moving targets up to 20,000 yards distant. The detector, AN/TPS-25 is officially described as "heralding a new era" in the art of battlefield surveillance.

Continuous Monitoring: Set permits continuous all-weather monitoring, day or night, of selected enemy areas by means of automatic radar scanning. It is capable of penetrating light foliage or brush.

Target Display: Moving targets will be presented both visually and aurally to the radar operator. Plotting of a target will be displayed automatically on the map board of the radar set, furnishing target range and azimuth. This is said to provide the means for more accurate and rapid collection of target information vital to the commander for the proper employment of his weapon system.

Aural Display, according to information provided Congress, varies with the type of target. For a moving man, set crackles. For a vehicle it makes a noise which has been compared to an automobile shifting gears. The sound rises and drops in tone as the target moves toward or away from the detector.

Army Radio Relay - Procurement plans for Army's recently publicized tactical communications radio relay set AN/GRC-53 produced by Westinghouse are now cancelled. Army says the set "lacks channel capacity, fails to meet weight and size characteristics and does not contain sufficient improvement to warrant the expenditure for replacement of existing equipments."

Shipboard Nuclear Reactor Program

A nuclear reactor for the Navy's destroyer fleet may not be available for another 10 to 15 years, according to Rear Adm. A.G. Mumma, Chief, Bureau of Ships. The estimate was a surprise to those who may have thought that the problem of naval reactors, once solved for the submarine, could rapidly be applied to other vessels.

Here is Adm. Mumma's explanation of the expected delay:

Light Weight Plant "The difficulty is one of getting a light enough plant into the destroyer. The problem is the fact that no matter how big the reactor power is, generally speaking, the thickness of the shield and the weight of the shield is a fixed amount, at least the thickness is a fixed amount pretty much for any reactor, so the destroyer which at the present time is our Navy's lightest powerplant, except for small boats of course, is very difficult to replace with a nuclear power plant...

Reactor Shielding "Whereas you do not have the weight of the fuel to carry, as you do in a conventional ship, the fuel can be dispersed around the ships in odds and ends of crannies and corners throughout the entire length of the ship, but the reactor cannot be handled that way. Reactor shielding has to be around the reactor and you cannot make an even break on that exchange in these light, high-powered units such as destroyers...

Nuclear Carrier "In the carrier it is a lot closer to being an even exchange, but even there, you will notice that our nuclear-powered carrier is about 9000 tons larger than our conventional-powered carrier, but it has a much greater capability than the conventional powered carrier, so that the weight is offset...

Summing Up "In the destroyer so far, as we go down in size, but still want to keep high power, that is where we run into this cross point where we have a great deal of difficulty in achieving high power and light weight."

AIR CRAFT EXPORT-IMPORT -- U.S. Department of Commerce will license civil aircraft and civil aviation equipment for export beginning June 1. This type of materiel is being removed from the U.S. Munitions List regulated by the Department of State. Military aircraft and equipment will remain under State Department's licensing authority.

The change also applies to unclassified technical data pertaining to civil aircraft commodities and to equipment and spare parts for repair, operation and maintenance of aircraft owned or operated by a U.S. or Canadian registered airline.

New regulations also provide that no license will be required to import civil aircraft, components and related equipment, except for aircraft obtained under the U.S. Foreign Property Disposal Program.

(Details available from Office of Administrative Operations, U.S. Department of Commerce, Washington 25, D.C. Ask for Export Bulletin No. 814)

NAVY SMOKELESS POWDER -- Navy is searching for a way to dispose of its huge surplus of smokeless powder. One recent contract seeks possible commercial applications. A method for continuous burning of smokeless powder is also under development. Estimates are that it would require five years to dispose of surplus now on hand with present burning methods.

RESEARCH CHECKLIST

( ) Resistor Research: Air Force is sponsoring an R&D program aimed at economic production of a series of high stability, high temperature fixed-film resistors that will function under high moisture and other adverse environmental conditions and over a temperature range of -65° to 150 and 200° C. It is believed that unique fabricating methods for vacuum deposition of resistive film on suitable substrates will lend themselves to high production rates.

(R&D by Electra Manufacturing Co., Independence, Kansas for Wright Air Development Center)

( ) Dry Radar Recording System: Army is sponsoring studies of unconventional photosensitive processes for use in a dry radar recording system. One phase of this project is an attempt to increase the speed, gamma and density range of conventional Kalfax films by addition of sensitizers, variation of plastic vehicles and research in effects of storage, high temperature and other factors.

(R&D by T.J. Moran's Sons, Inc., New Orleans, La. for Photographic Branch, Applied Physics Divisions, Army Signal R&D labs, Ft. Monmouth, N.J.)

( ) Aircraft Beam Structures: Office of Naval Research is sponsoring investigations of the internal radiant heat transfer in stainless steel box beams which indicate a new means of saving weight in aircraft beam structures. According to the studies, simple blackening of the internal surfaces of the structure can increase internal radiation transfer and alleviate the thermal stresses and deflections that can cause failure in supersonic aircraft and other structures subjected to high temperatures.

(Report available. Free. Write Office of Technical Information, National Bureau of Standards, Washington 25, D.C. for Summary Technical Report No. 2340)

( ) Titanium Lubricants: Army is sponsoring studies aimed at development of lubricants for titanium and titanium alloys surfaces. Work includes modification of surfaces to make them reactive with polar organic compounds. Friction and wear reduction are being measured under various conditions of sliding, loading and temperature. Investigators report that satisfactory diffusion techniques have been accomplished using copper, iron, nickel, chromium, cobalt, silver or lead.

(Research by Pitman-Dunn Laboratories Division, Frankford Arsenal, Philadelphia 37, Pa.)

( ) Sounding Rocket System: Five-stage solid fuel rocket system developed by National Aeronautics and Space Administration for hypersonic aerodynamic research has been modified to an altitude sounding device which can boost a 25 pound payload to a height of 525 nautical miles.

(Report available. Free. Write Research Information, NASA, 1520 H Street, N.W. for NASA Memo 3-6-59L)

( ) Uranium for Industry: Atomic Energy Commission is sponsoring a three-month technical and economic study of applications for depleted uranium. Substantial tonnage is now available in the form of uranium hexafloride from which most of the fissionable U-235 is removed. New applications will be sought and traditional applications will be reviewed including use as a coloring agent in glass or glazes, as a component in certain alloys and as a chemical agent in photography.

(Study coordinated by Dr. Harlan W. Nelson, Battelle Memorial Institute, Columbus, Ohio)

( ) Molecular Still: Separation and purification of high-boiling point materials is reportedly made possible by a simple rotating molecular still. Device is expected to be of particular use in petroleum research, where various distillation techniques are applied in studying by-products, and in biochemical and pharmaceutical work as a purification technique.

(Report available. Free. Write Office of Technical Information, National Bureau of Standards, Washington 25, D.C. for Summary Technical Report No. 2323)

( ) Hot Gas Servomechanisms: Studies sponsored by the U.S. Air Force have led to development of a method for hot gas generation and utilization in a converter to produce hydraulic power. Investigators at Minneapolis-Honeywell Regulator Co. chose hydrazine as a fuel and constructed a generator capable of producing hot gas at 3000 psi. Unit was found to have satisfactory steady-state and transient operating characteristics.

(Report available. 103 pages. $2.50. Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 151 450)

( ) Computer Flight Planning: Air Weather Service has developed a program with digital computers. With information on route terminals, the computers rapidly provide navigation information along great circle routes using hourly barotropic forecasts. "Paper" test runs indicate that the forecast information is sufficiently accurate to be of value in all types of flight planning.

( ) Ozone Research: Five new instruments are being tested in Government-sponsored program for the measurement of ozone on the ground and in the upper atmosphere. One joint project, at Lowry Air Force Base, Colorado, employs three different ozonesondes for clues to the winds and temperatures of the stratosphere and the rate of fall-out of atomic debris. An expanded network of seven stations is also being set up by the Weather Bureau to measure the amount of ozone between the earth and the sun. A spectrophotometer designed in England and an automatic surface recorder invented at the University of New Mexico will be used.

( ) Gas-Purification: Royalty-free, non-exclusive licenses are available to U.S. manufacturers who wish to use an improved method developed by the U.S. Bureau of Mines for purifying certain industrial gases. The new method is said to offer substantial savings to makers of synthetic ammonia, chemicals and other products.

(Some details available. Write Information Service, U.S. Bureau of Mines, Washington 25, D.C. for P.N. 54329)

Publications Checklist

( ) Cooperative Research, an excellent summary of research activities by trade associations, societies and other cooperative organizations. Includes a comprehensive survey of books and magazine articles on technical research, inventions, patents and research management. 59 pages. Single copies. Free. (Write Committee on the Judiciary, Subcommittee on Patents, Senate Office Building, Washington 25, D.C. for Study No. 21 - Technical Research Activities)

( ) Air Pollution, the proceedings of the National Conference on Air Pollution held in Washington Nov. 18-20, 1958. A valuable reference work on this many-faceted problem. 526 pages. Single copies. Free. (Write Public Inquiry Office, U.S. Public Health Service, Washington 25, D.C. for PHS Publication No. 654)

( ) Naval Research Laboratory, a bibliography of some 4000 technical reports on investigations by the U.S. Naval Research Laboratory. Information on ordering reports available to the public is included. 131 pages. $2.75. (Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 151 428)

( ) High-Temperature Pyrometry, a report on a 1958 symposium dealing with high temperature standardization and the calibration, use and manufacture of optical pyrometers. Discussions centered on present temperature measurement techniques and instruments, and the use of the temperature scale beyond 4000 K. Report available. Free. (Write Office of Technical Information, National Bureau of Standards, Washington 25, D.C. for Summary Technical Report No. 2354)

( ) Standard Materials, the latest catalog of standard materials and samples available from the National Bureau of Standards. Includes information on certified compositions, properties and purchase procedures. Materials are used in checking analytical methods, standardizing solutions, and calibrating many instruments. 27 pages. 35 cents. (Write Superintendent of Documents, Government Printing Office, Washington, 25, D.C. for Bureau of Standards Circular 552)

( ) Atomic Industry Directory, provides data on products, equipments and services of more than 200 industrial organizations in the nuclear field. 132 pages. $2.50. (Write Atomic Industrial Forum, 3 East 54th St., N.Y. 22, N.Y. Att: Department R)

( ) Electron Tubes, A Government handbook intended to provide guidance to design engineers in the application of electron tubes to military electronic equipment. Discusses tube properties, circuit design, manufacturer's life-test data and other information. Newly revised. 684 pages. $3.25. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Publication No. D 7.5/2:211)

( ) Solid State Physics, a description of programs designed to help solve the problems posed by semiconducting materials and their effective application. 13 pages. Free. (Write Office of Technical Information, National Bureau of Standards for Summary Technical Report No. 2338)

( ) International Atomic Energy, a new, attractive publication on the peaceful uses of atomic energy. Issued Quarterly. Free. (Write Publication Division, International Atomic Energy Agency, Karntnerring 11, Vienna 1, Austria for IAEA Bulletin)